

# **DIS – Wheeler Site Traffic Impact Analysis**

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**Wright Runstad**

**March 2008**

**Parametrix**

# **DIS - Wheeler Site Traffic Impact Analysis**

*Prepared for*

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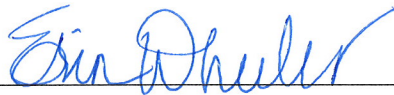
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## **CITATION**

Parametrix. 2008. DIS - Wheeler Site  
Traffic Impact Analysis. Prepared by Parametrix,  
Lacey, Washington. March 17, 2008.

## CERTIFICATION

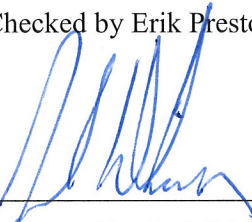
The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.



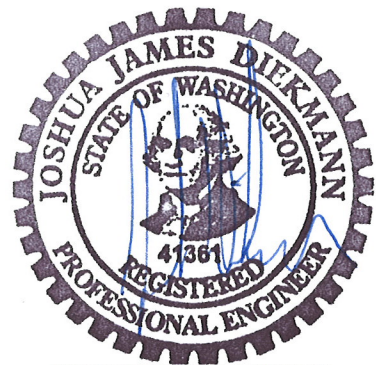
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Checked by Erik Preston, EIT, Traffic Analyst



Approved by Josh Diekmann, PE, PTOE



EXPIRES: 7-29-08



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# 1. INTRODUCTION

## 1.1 PROJECT OVERVIEW

The Washington State Department of Information Services (DIS) proposes development of three buildings on approximately 8.8 acres located at the southeast corner of the Jefferson Street SE/14<sup>th</sup> Avenue SE intersection in the City of Olympia. The proposed *DIS – Wheeler Site* development will provide office and data center space for DIS, the Washington State Patrol (WSP) and other State agencies. **Figure 1** illustrates the site vicinity and the transportation network serving the project area.

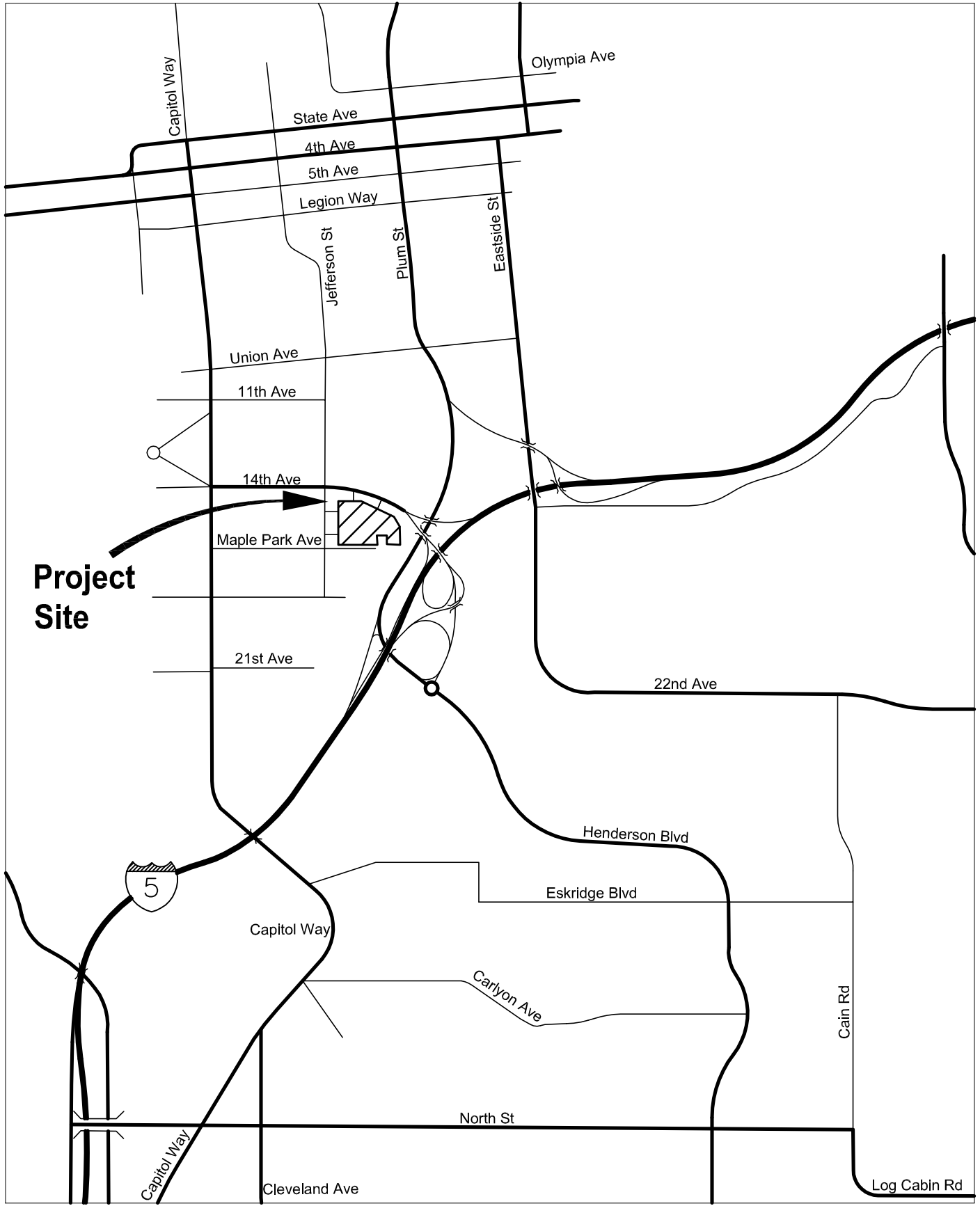
## 1.2 STUDY CONTEXT

This report documents the results of a Traffic Impact Analysis (TIA) conducted by Parametrix to assess existing and future traffic conditions in the vicinity of the proposed *DIS – Wheeler Site* development. The study was prepared according to City of Olympia TIA guidelines as part of the required environmental review submittal for the proposed project. Twelve intersections and proposed site accesses were analyzed in order to evaluate project-related impacts:

- Capitol Way S/5<sup>th</sup> Avenue
- Capitol Way S/Legion Way
- Capitol Way S/Union Avenue
- Capitol Way S/11<sup>th</sup> Avenue
- Capitol Way S/14<sup>th</sup> Avenue
- Capitol Way S/Maple Park Avenue SE
- Capitol Way S/21<sup>st</sup> Avenue
- Capitol Way S/Carlyon Avenue SE
- Jefferson Street SE/Union Avenue SE
- Jefferson Street SE/14<sup>th</sup> Avenue SE
- Jefferson Street SE/Maple Park Avenue SE
- 14<sup>th</sup> Avenue Extension/Henderson boulevard SE

Construction is expected to begin in 2008, with full occupancy anticipated in 2010, which was used as the horizon year for this study.

The scope of this study was determined using City of Olympia guidelines, and was approved by WSDOT and the City of Olympia.



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**Figure 1**  
**Site Vicinity**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**

## 2. PROJECT DESCRIPTION

### 2.1 DEVELOPMENT PROPOSAL

Washington State Department of Information Services (DIS) proposes development of the *DIS – Wheeler Site* in the Capitol Campus area of Olympia, to be located east of Jefferson Street SE and south of 14<sup>th</sup> Avenue SE. The project will consist of three multi-story buildings with the following anticipated uses:

- 175,000 square foot building will provide office space for DIS and WSP
- 161,850 square foot building will provide office space for DIS
- 126,900 square foot data center complex, including link functions, loading docks and production areas

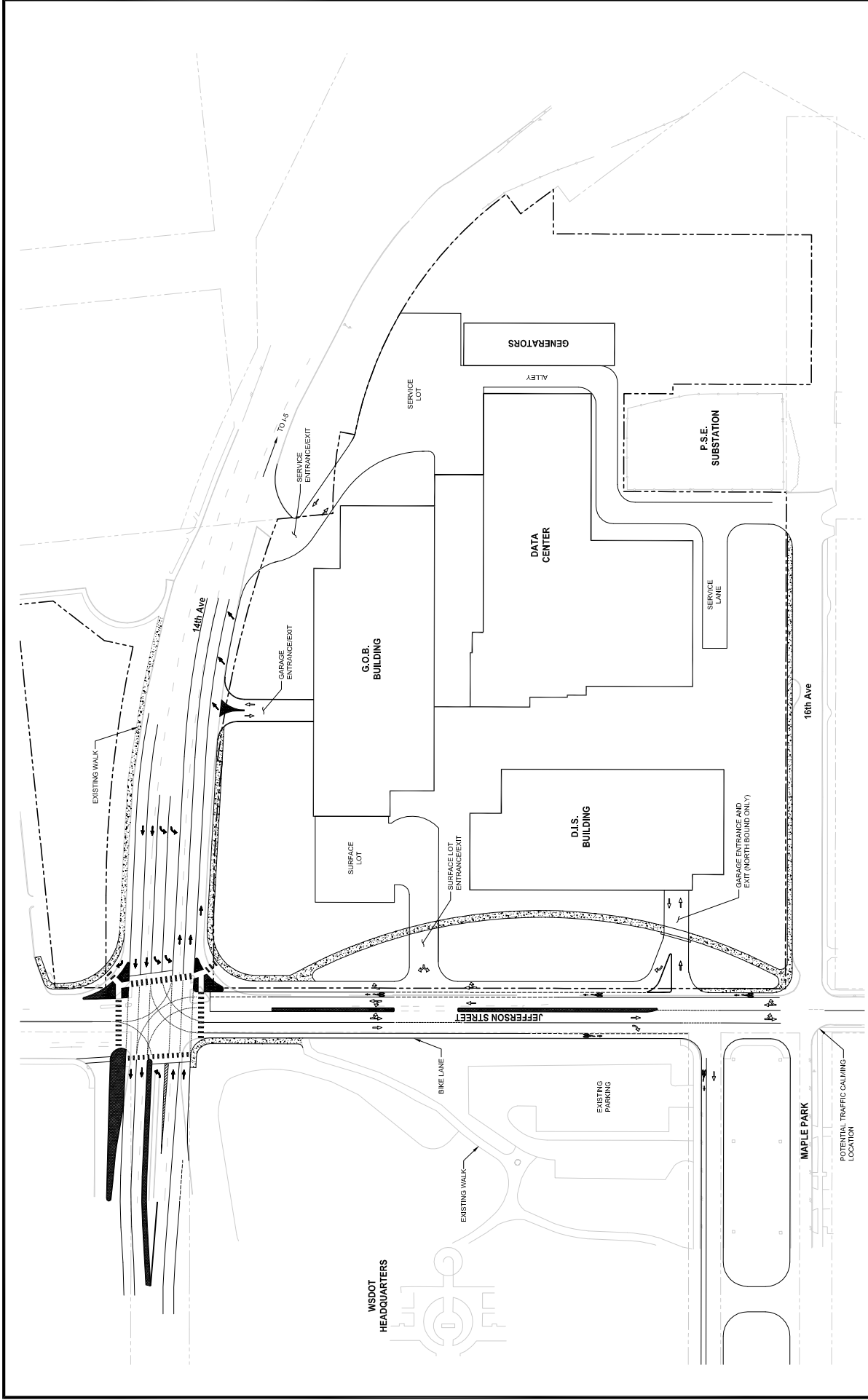
A twenty-space surface parking lot and an underground parking garage will provide a combined total of approximately 950 parking stalls, which is greater than expected peak demand at full occupancy. Parking is expected to be fully accommodated on-site. The State is currently conducting a Capitol Campus Parking and Circulation Study. Findings of this study are expected to improve coordination among the various parking facilities located on the Capitol Campus.

Proposed access points for *DIS – Wheeler Site* to/from Jefferson Street SE include the north entrance, a full access located approximately 200 feet south of 14<sup>th</sup> Avenue SE, and the south entrance, a limited access located approximately 100 feet north of Maple Park Avenue SE. The north entrance will provide full access for a surface parking lot of approximately 20 spaces. The south entrance will have full in- and outbound access to the parking garage, with outbound movements limited to right-turn only, to discourage exiting vehicles from using adjacent residential neighborhood streets as a travel route.

Proposed access points to/from 14<sup>th</sup> Avenue SE include the existing right-in, right-out (RIRO) access point at the eastern property line, and a new restricted access point between the intersection of 14<sup>th</sup> Avenue SE and Jefferson Street SE. The existing RIRO access point will be retained to provide service and emergency vehicle access. The new access point will provide RIRO access to the underground garage. **Figures 2a** and **2b** illustrate the proposed site plan and access points.

Current pedestrian facilities in the immediate project vicinity are limited; however, the proposed development will include construction of new facilities to provide connections to those already existing (see conceptual site plan provided in Figures 2a and 2b), which provide good connectivity between facilities throughout the Capitol Campus and to the downtown core.

On the western site boundary, a pedestrian walkway will be set back from the roadway frontage. New crosswalks are proposed at primary intersections around the site. The existing crosswalk south of the Jefferson Street SE/14<sup>th</sup> Avenue SE intersection will be replaced by a crosswalk on the south leg of the intersection; crosswalks will be placed on the remaining three legs of the intersection as well to improve connectivity. These improvements provide continuity with the existing sidewalk on the north side of 14<sup>th</sup> Avenue SE, and from there, the trail connection at the intersection of 15<sup>th</sup> Avenue SE and Chestnut Street.

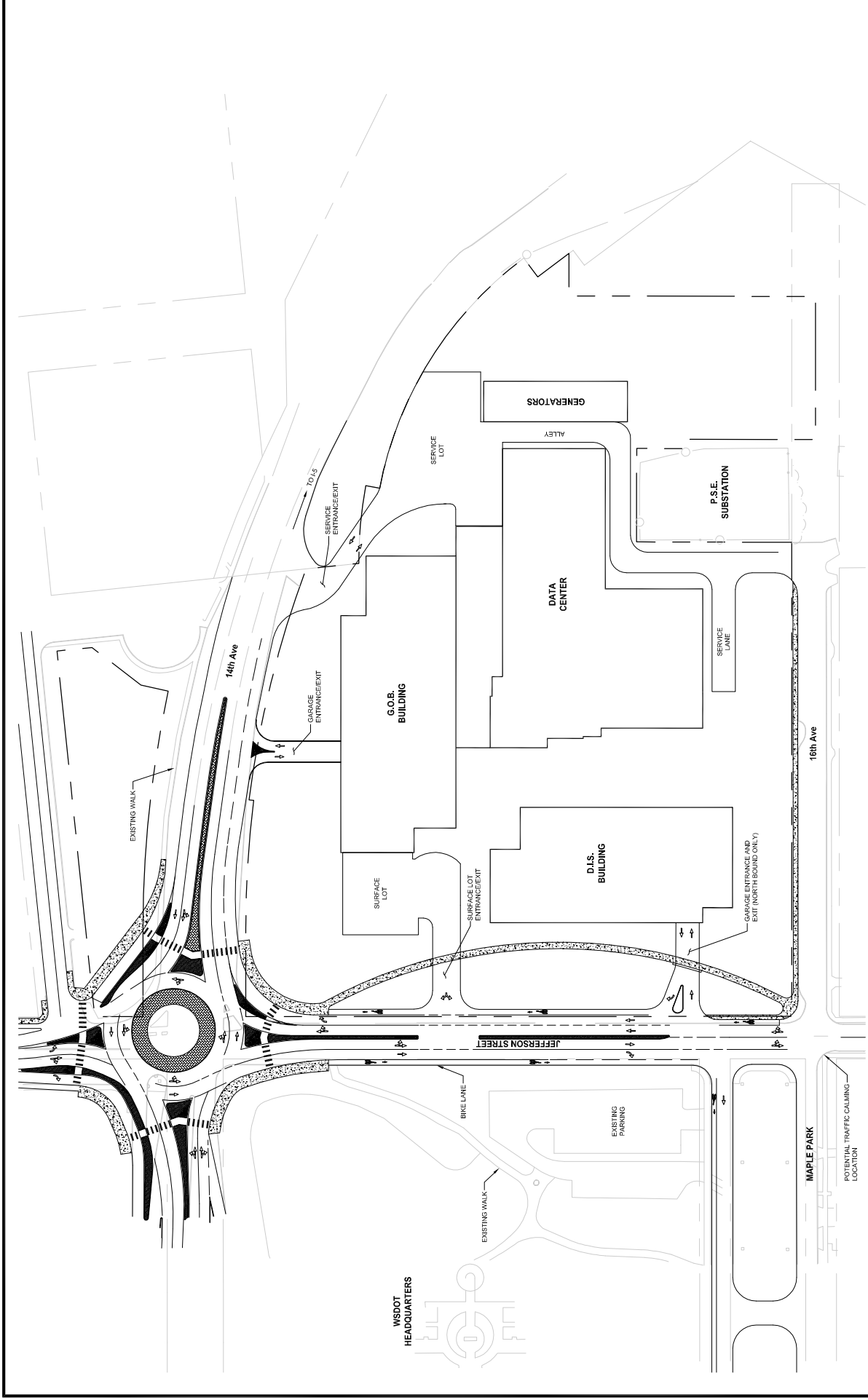


**Figure 2a**  
**Preliminary Site Plan With Conceptual Signal Improvement and Right-In, Right-Out 14th Ave Driveway**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**

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**Parametrix**

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**Figure 2b**  
**Preliminary Site Plan With Conceptual Roundabout Improvement and Right-Out Only 14th Ave Driveway**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**



**NO SCALE**



## **3. BACKGROUND INFORMATION**

### **3.1 EXISTING SITE AND AREA LAND USES**

The approximately 8.8 acre site is currently used as a parking lot for the Intercity Transit (IT) DASH shuttle service, state employees, and visitors to the capitol. Existing structures on the site include a small daycare facility and five former residential structures that have been converted to state office functions.

Properties to the south of the site are single- and multi-family housing; administrative government buildings are to the west and north; and Interstate 5 is to the east.

The site is located within the area designated by the City of Olympia's current Transportation Comprehensive Plan as a high-density core area, and the Capitol Campus Master Plan identifies the location as a site for major state office buildings.

### **3.2 ROADWAY INVENTORY**

A comprehensive roadway inventory was performed by Parametrix to identify pre-existing conditions of the primary traffic facilities serving the site of the proposed *DIS – Wheeler Site* development.

#### **3.2.1 Interstate 5 (I-5)**

This facility is a six-lane limited-access freeway that serves as the major north-south corridor in western Washington. In the project vicinity, direct access is provided via interchanges at Plum Street and 14<sup>th</sup> Avenue SE (Exits 105 A and B). This facility is under the jurisdiction of the Washington State Department of Transportation (WSDOT) and has a posted speed limit of 60 mph.

#### **3.2.2 Capitol Way S**

Capitol Way S is a north/south arterial that travels through downtown Olympia. In the project vicinity, Capitol Way S consists of 2 travel lanes in each direction, with sidewalks on both sides of the street and intermittent parking. At its intersections with 11<sup>th</sup> Avenue SE and 14<sup>th</sup> Avenue SE, the roadway widens to accommodate east- and westbound turning movements.

#### **3.2.3 14<sup>th</sup> Avenue SE**

14<sup>th</sup> Avenue SE is an arterial that runs between the main Capitol Campus to the west and I-5 to the east. It generally consists of two travel lanes in each direction and has a posted speed limit of 25 mph. At its intersection with Jefferson Street SE, 14<sup>th</sup> Avenue widens to 7 lanes to accommodate north- and eastbound right-turn movements as well as southbound left-turn movements. Sidewalk is provided on the north side of the street, and provides a connection to the regional trail facility from 15<sup>th</sup> Avenue SE and Chestnut Street. Bicycles are prohibited on 14<sup>th</sup> Avenue west of Jefferson.

#### **3.2.4 Jefferson Street SE**

Through the project vicinity, Jefferson Street SE is a 3 to 4-lane north/south arterial with sidewalks and bike lanes on both sides of the roadway and limited on-street parking along the west side of the street.



### 3.2.5 Henderson Boulevard

Henderson Boulevard provides a connection from the Plum Street and 14<sup>th</sup> Avenue Extension/1-5 interchanges south to Tumwater and unincorporated Thurston County. In the vicinity of the project site, Henderson Boulevard is a 4 to 5-lane arterial with paved shoulders and a posted speed limit of 35 mph.

### 3.2.6 Legion Way

Legion Way is a 2 to 3-lane major collector that runs east-west through the project area. Legion way has sidewalks and parking on both sides of the roadway and a posted speed limit of 25 mph.

### 3.2.7 Union Avenue

Union Avenue is a 4 to 5-lane arterial that runs east-west through the project area and provides a connection between Capitol Way S and Plum Street. Sidewalks are provided on both sides of the roadway.

### 3.2.8 11<sup>th</sup> Avenue SE

11<sup>th</sup> Avenue SE provides an east-west connection running from Capitol Way S and terminating just east of Chestnut Street SE. Between Washington Avenue SE and Jefferson Street SE, 11<sup>th</sup> Avenue SE is a 2-lane major collector with a landscaped center median.

### 3.2.9 21<sup>st</sup> Avenue SE

21<sup>st</sup> Avenue SE is an east-west local roadway that provides access to residential neighborhoods to the south of the Capitol Campus. Sidewalks and on-street parking are provided on both sides of the street.

### 3.2.10 Carlyon Avenue SE

Carlyon Avenue SE is an east-west major collector providing a connection through residential neighborhoods located between Capitol Boulevard and Henderson Boulevard. The posted speed limit is 25 mph and sidewalks are provided on both sides of the roadway.

### 3.2.11 Maple Park Avenue SE

Providing a connection between Capitol Way S and Jefferson Street SE, Maple Park Avenue SE is a 2 to 3-lane major collector divided by a landscaped median. Sidewalks are provided on both sides of the roadway. Land use along Maple Park Avenue SE consists of primarily residential use to the south and state government offices to the north.

## 3.3 TRAFFIC VOLUME DATA

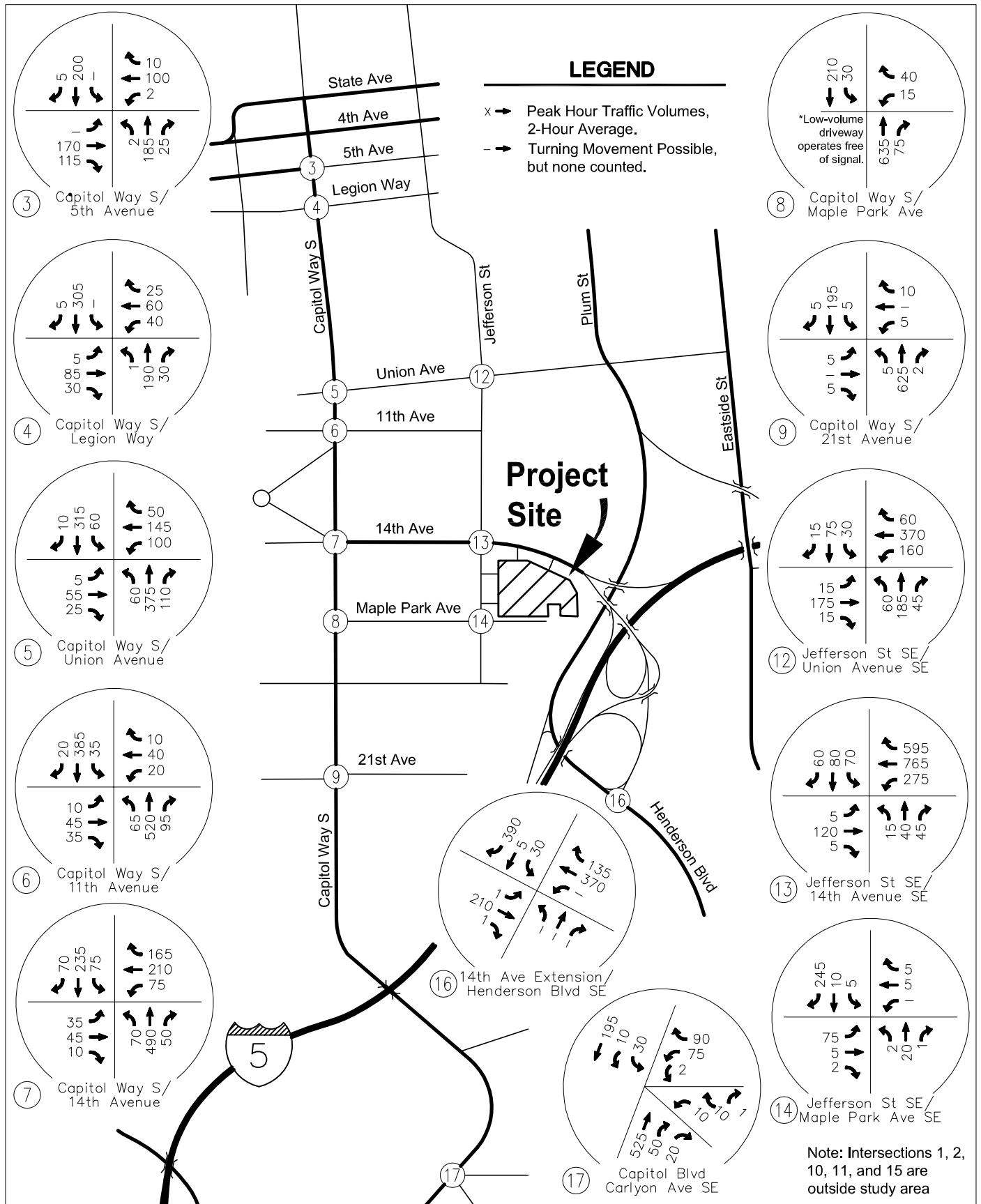
The City of Olympia provided traffic data consisting of available tube and turning movement counts collected in 2007 and 2008 for roadways within the study area. Additional data was collected during 2008 by Trafficount, a local traffic data collection firm.

All counts were collected during periods when the State Legislature was in session. These traffic volumes were used for 2008 base year operations analysis and as the basis for future year traffic volume projections. **Figures 3a** and **3b** show existing 2008 traffic volumes for the study intersections. Detailed turning movement count data is provided in *Appendix A*.

### **3.4 PUBLIC TRANSPORTATION**

The site is currently served by IT Commuter Express Route numbers 601, 603, and 620. Routes 12, 13 and 68 run alongside Capital Way S and Route 94 runs north of the site along Union Ave.

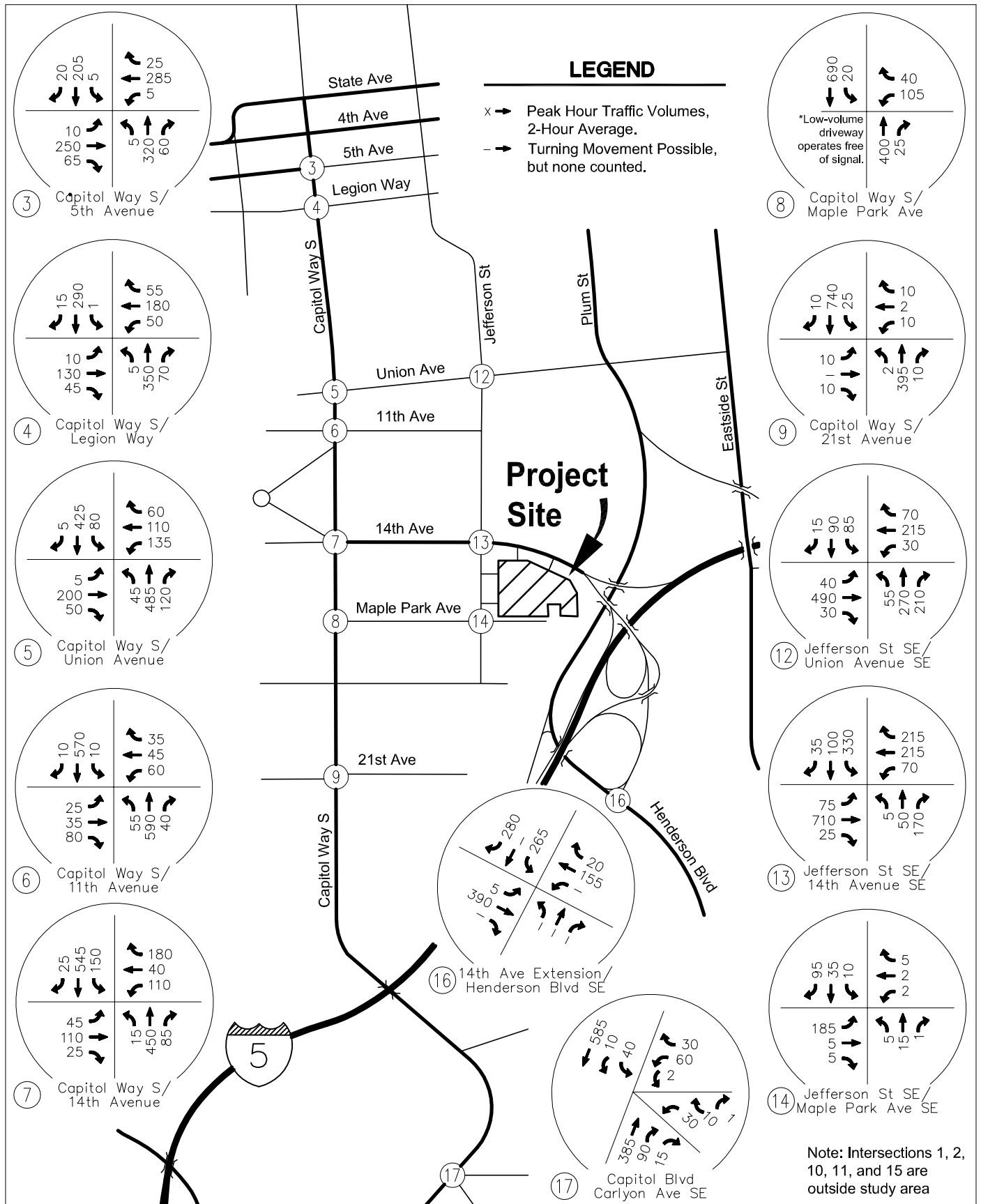
IT also operates DASH, a free shuttle service designed to enhance access to and from downtown Olympia and the Capitol Campus. DASH buses provide high frequency service past multiple parking lots, including the lot currently situated at the Wheeler site.



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**Figure 3a**  
**2008 Existing Traffic Volumes - AM Peak Hour**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**



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**Figure 3b**  
**2008 Existing Traffic Volumes - PM Peak Hour**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**



## 4. PROJECT TRAFFIC CHARACTERISTICS

The two project-related characteristics having the most effect on area traffic conditions are peak hour trip generation and the directional distribution of traffic volumes upon the surrounding roadway network.

### 4.1 PROJECT TRIP GENERATION

Vehicle trip generation for both proposed and existing land uses was calculated using the trip generation rates contained in the current edition of the City of Olympia's Traffic Impact Fee (TIF)/Traffic Impact Analysis (TIA) Guidelines. Where trip rates were not available in the City guidelines, rates for comparable land uses contained in the most current edition of Trip Generation by the *Institute of Transportation Engineers (ITE)* were used. Trip generation rates used for this analysis are shown below in **Table 4-1**.

**Table 4-1. Trip Generation Characteristics**

Land Use	Unit	Time Period	Trip Generation		
			Trip Rate	% Enter	% Exit
<b>Proposed:</b>					
Downtown Administrative Office > 300,000 gsf	GSF	AM Peak Hour <sup>1</sup>	1.03	88%	12%
		PM Peak Hour	0.99	17%	83%
		Daily <sup>1</sup>	7.32	50%	50%
Warehousing/Storage	GSF	AM Peak Hour <sup>2</sup>	0.46	82%	18%
		PM Peak Hour	0.48	25%	75%
		Daily <sup>2</sup>	4.96	50%	50%
<b>Existing:</b>					
Downtown Administrative Office < 100,000 gsf	GSF	AM Peak Hour <sup>3</sup>	1.87	88%	12%
		PM Peak Hour	1.80	17%	83%
		Daily <sup>3</sup>	13.30	50%	50%
Daycare	GSF	AM Peak Hour <sup>4</sup>	9.59	53%	47%
		PM Peak Hour	9.89	47%	53%
		Daily <sup>4</sup>	59.48	50%	50%

1 Used rate for ITE Land Use Code 710 General Office Building

2 Used rate for ITE Land Use Code 150 Warehousing

3 Used rate for ITE Land Use Code 710 General Office Building

4 Used rate for ITE Land Use Code 565 Day Care Center

As indicated in the table, with the exception of the proposed Warehousing/Storage use, AM peak hour trip rates are generally higher than PM peak hour trip rates for both proposed and existing land uses.

The total trip generation expected from this development is calculated by applying the total square footage to the appropriate trip generation rate. Because DIS anticipates that existing land uses will be removed and replaced by the new development, the total trip generation

expected to result from the proposed *DIS – Wheeler Site* development was determined by subtracting total trips generated by existing uses from total projected trips associated with proposed new land uses. These calculations are summarized in **Table 4-2**.

**Table 4-2. Project Trip Generation Summary**

Land Use	GSF	Time Period	Trip Generation		
			Trips	Enter	Exit
<b>Proposed:</b>					
Downtown Administrative Office > 300,000 gsf	336,850	AM Peak Hour	346	304	42
		PM Peak Hour	333	103	230
		Daily	2,460	1,230	1,230
Warehousing/Storage	126,900	AM Peak Hour	58	48	10
		PM Peak Hour	61	15	46
		Daily	644	322	322
<b>Existing (to be removed):</b>					
Downtown Administrative Office < 100,000 gsf	18,156	AM Peak Hour	(34)	(30)	(4)
		PM Peak Hour	(33)	(6)	(27)
		Daily	(244)	(122)	(122)
Daycare	5,556	AM Peak Hour	(53)	(28)	(25)
		PM Peak Hour	(55)	(26)	(29)
		Daily	(330)	(165)	(165)
<b>Total New Trips:</b>		<b>AM Peak Hour</b>	<b>317</b>	<b>294</b>	<b>23</b>
		<b>PM Peak Hour</b>	<b>306</b>	<b>86</b>	<b>220</b>
		<b>Daily</b>	<b>2,530</b>	<b>1,265</b>	<b>1,265</b>

## 4.2 TRIP DISTRIBUTION

The vehicle directional trip distribution to and from the site will be based primarily on:

- the area street system characteristics
- current travel patterns on the area roadways
- the proposed access system for the project
- locations of residential areas and shopping/commercial centers

For this study, the regional distribution of traffic to and from the proposed project was estimated using the regional transportation model. The Thurston Regional Planning Council (TRPC) created the area-wide transportation model with cooperation from local jurisdictions within the county. The model has been calibrated to accurately represent the existing vehicle travel patterns throughout the entire county.

In the transportation model, the countywide transportation network is divided into 483 Traffic Analysis Zones (TAZs). The *DIS – Wheeler Site* is located within TAZ numbers 85 and 82. Of the two TAZs, model data for TAZ 85 was selected for use in this study because its land use (primarily government office buildings) most closely matches that of the proposed development. Model data for TAZ 85 was modified to reflect the proposed Jefferson Street SE access points, and to account for actual driveway locations and existing travel patterns.

From this information, refined distribution percentages were calculated for future traffic from the proposed development, indicating the following directional peak hour traffic flows:

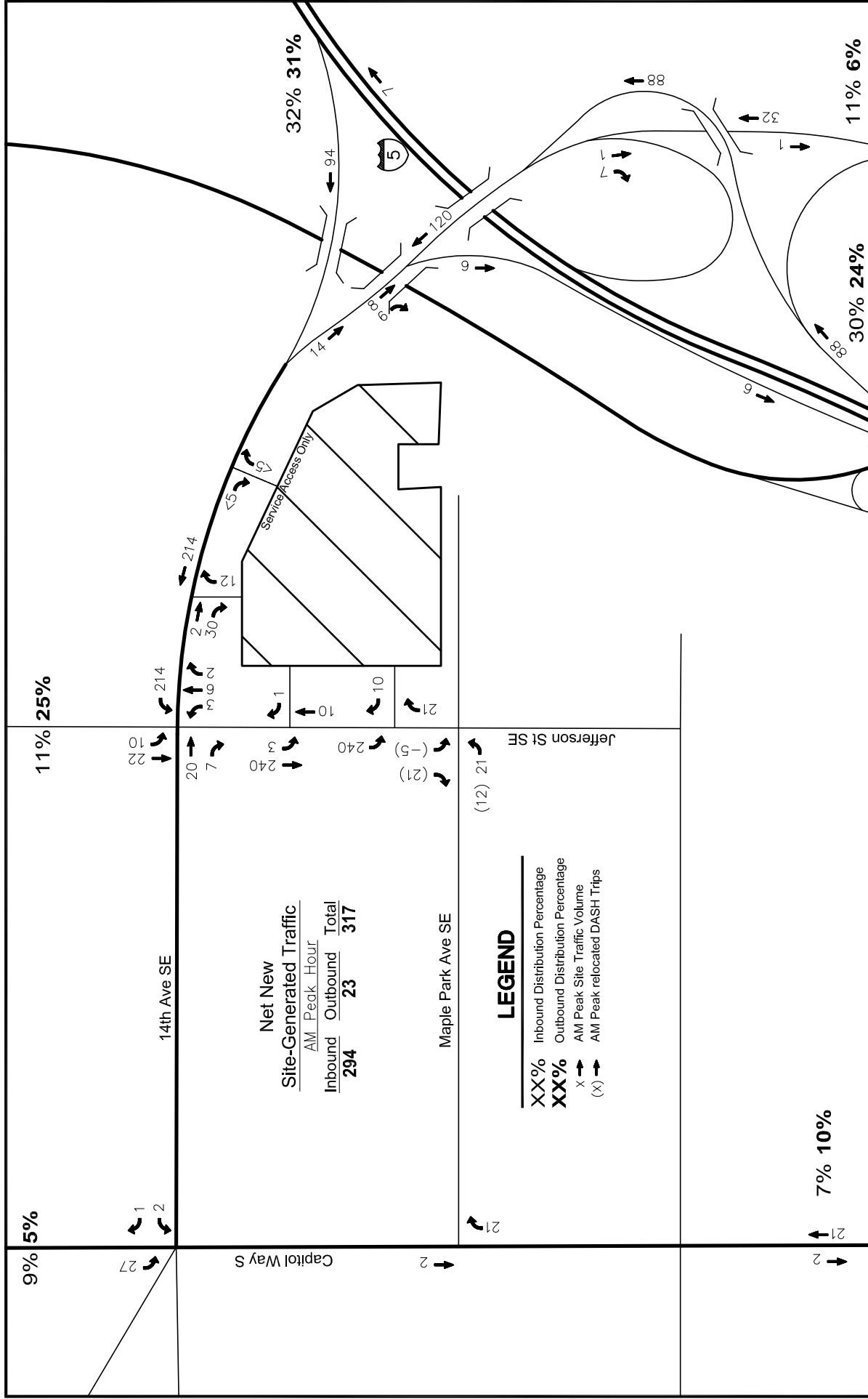
- to/from the north and northeast via Jefferson Street SE: 13% AM – 15% PM
- to/from the east, southeast, and I-5 via 14th Avenue SE: 71% AM – 65% PM
- to/from the south via Capitol Way S: 7% AM – 10% PM
- to/from the northwest via Capitol Way S: 9% AM – 10% PM

Inbound and outbound trip distribution percentages and trip assignment are illustrated in **Figures 4a, 4b, 4c, and 4d.**

The project trip generation and distribution were approved by WSDOT and the City of Olympia during the traffic scoping process.



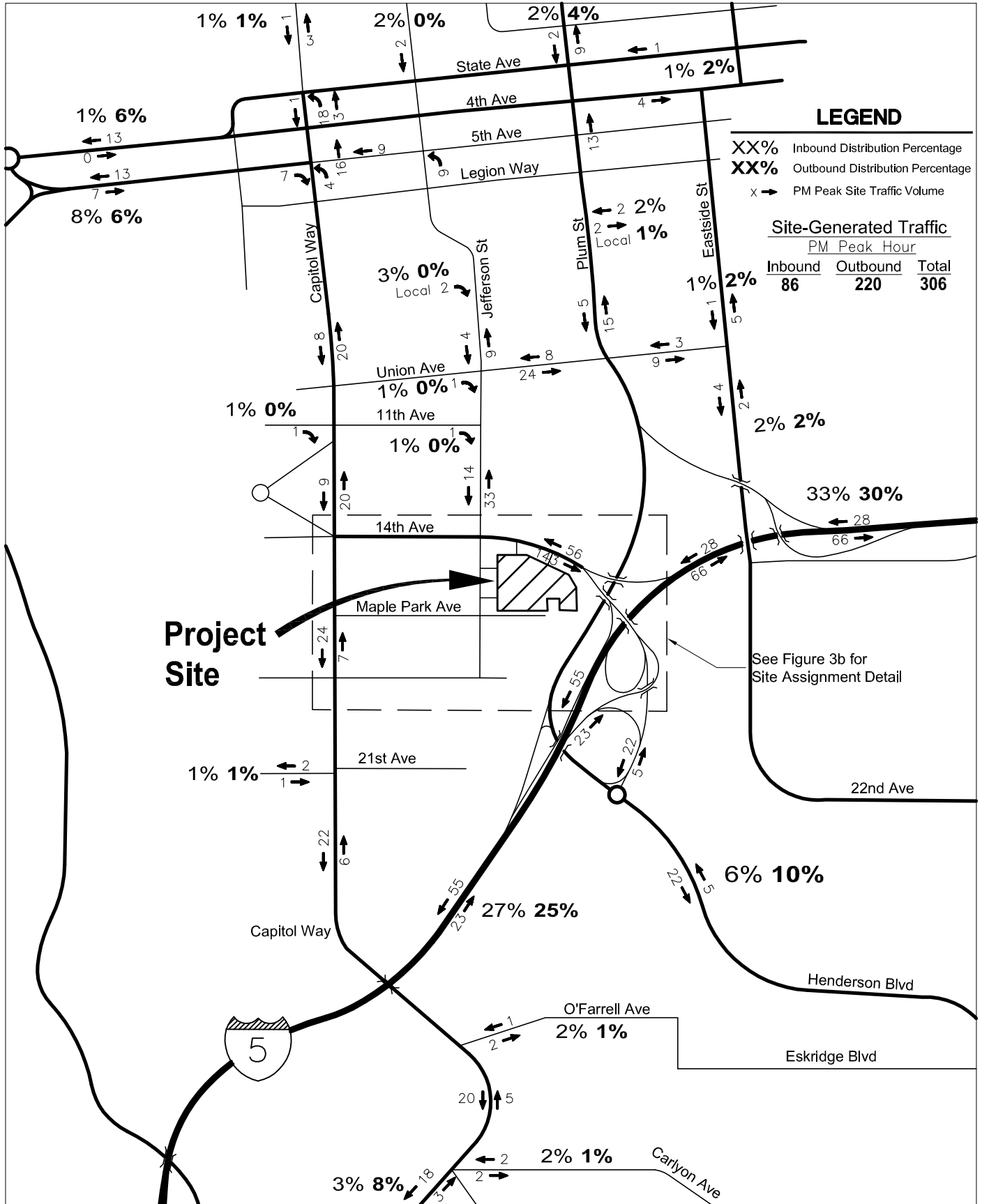




**Figure 4b**  
**Site Vicinity Trips Distribution and Assignment Detail - AM Peak Hour**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**



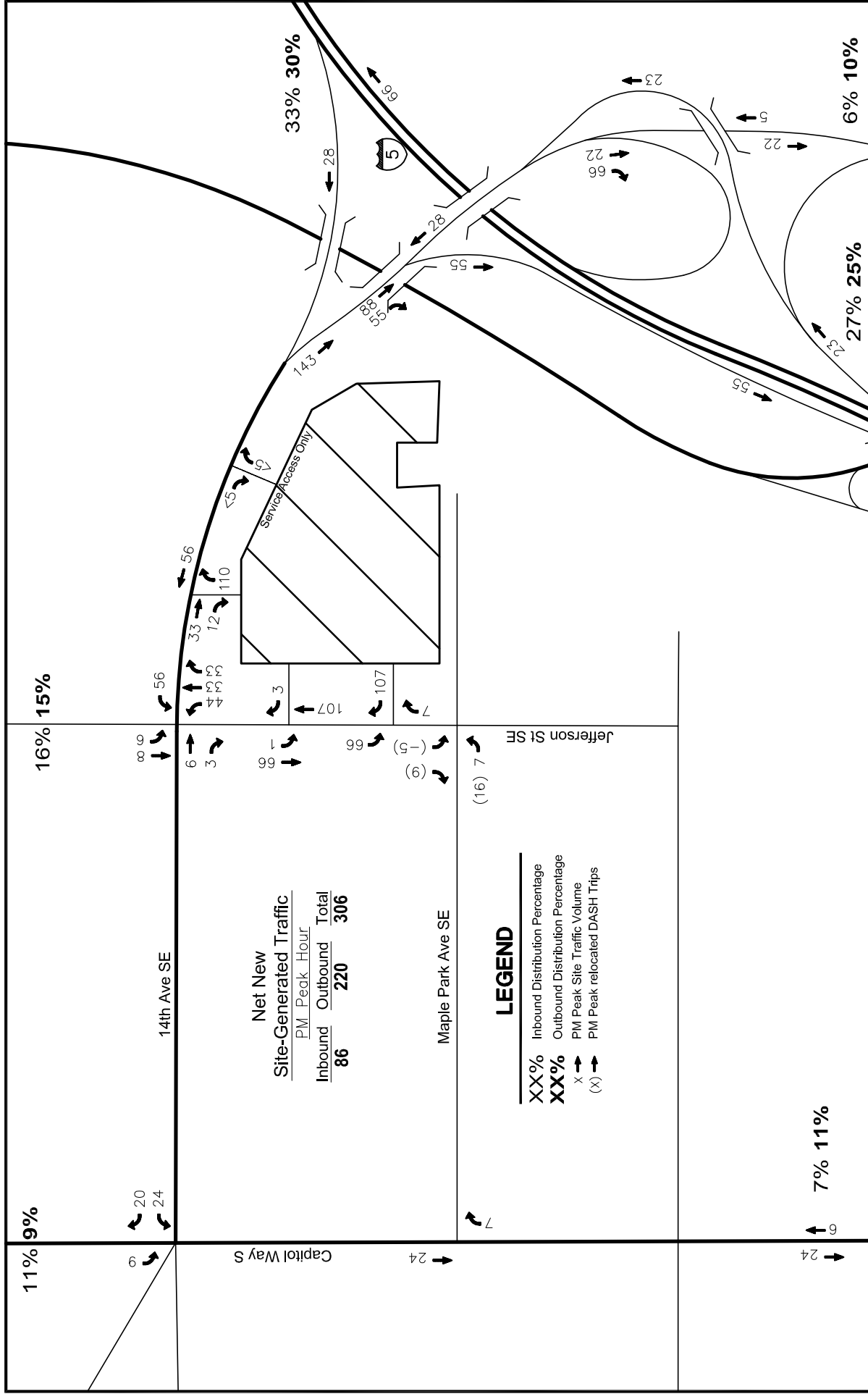
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**Figure 4c**  
**PM Peak Hour Site Traffic Distribution and Assignment**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**



**Figure 4d**  
**Site Vicinity Trips Distribution and Assignment Detail - PM Peak Hour**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**



**NO SCALE**



## 5. FUTURE TRAFFIC CONDITIONS

### 5.1 ROADWAY IMPROVEMENTS

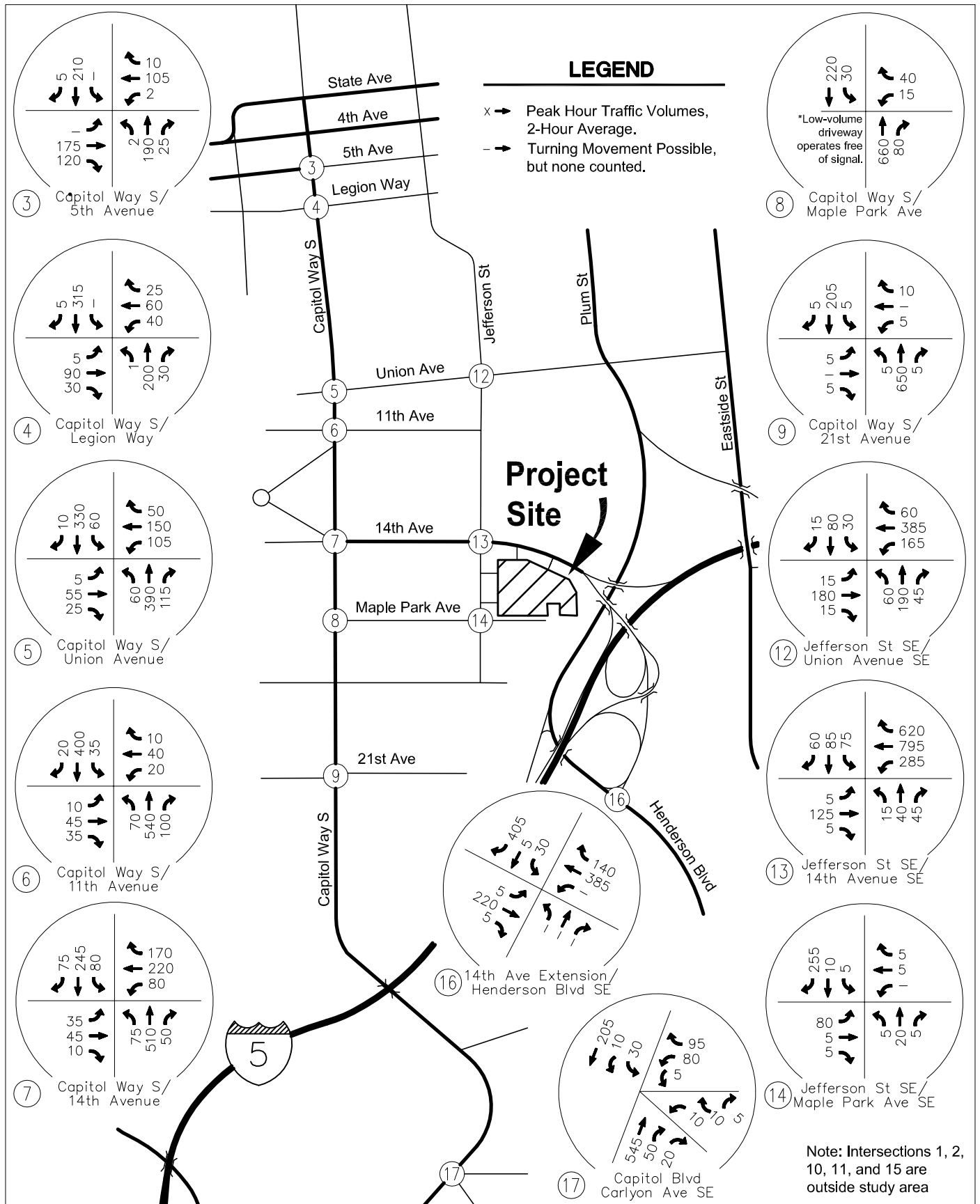
Improvements identified in the City of Olympia's 6-year Transportation Improvement Program were not considered in this analysis. The projected future operations were based only on existing facilities.

### 5.2 FUTURE TRAFFIC VOLUMES

#### 5.2.1 Background Traffic Growth

In addition to traffic from the identified pipeline developments, it is anticipated that background growth will occur within the study area and affect traffic volumes. To estimate the non-specific traffic growth that will occur at the study intersections, we applied an annual growth rate of 2% to the base year traffic volumes. The 2% growth rate is based on historical growth trends and was determined by the City of Olympia. The projected 2010 traffic with background growth traffic, but without the *DIS – Wheeler Site* project traffic volumes are shown on **Figures 5a** and **5b**.

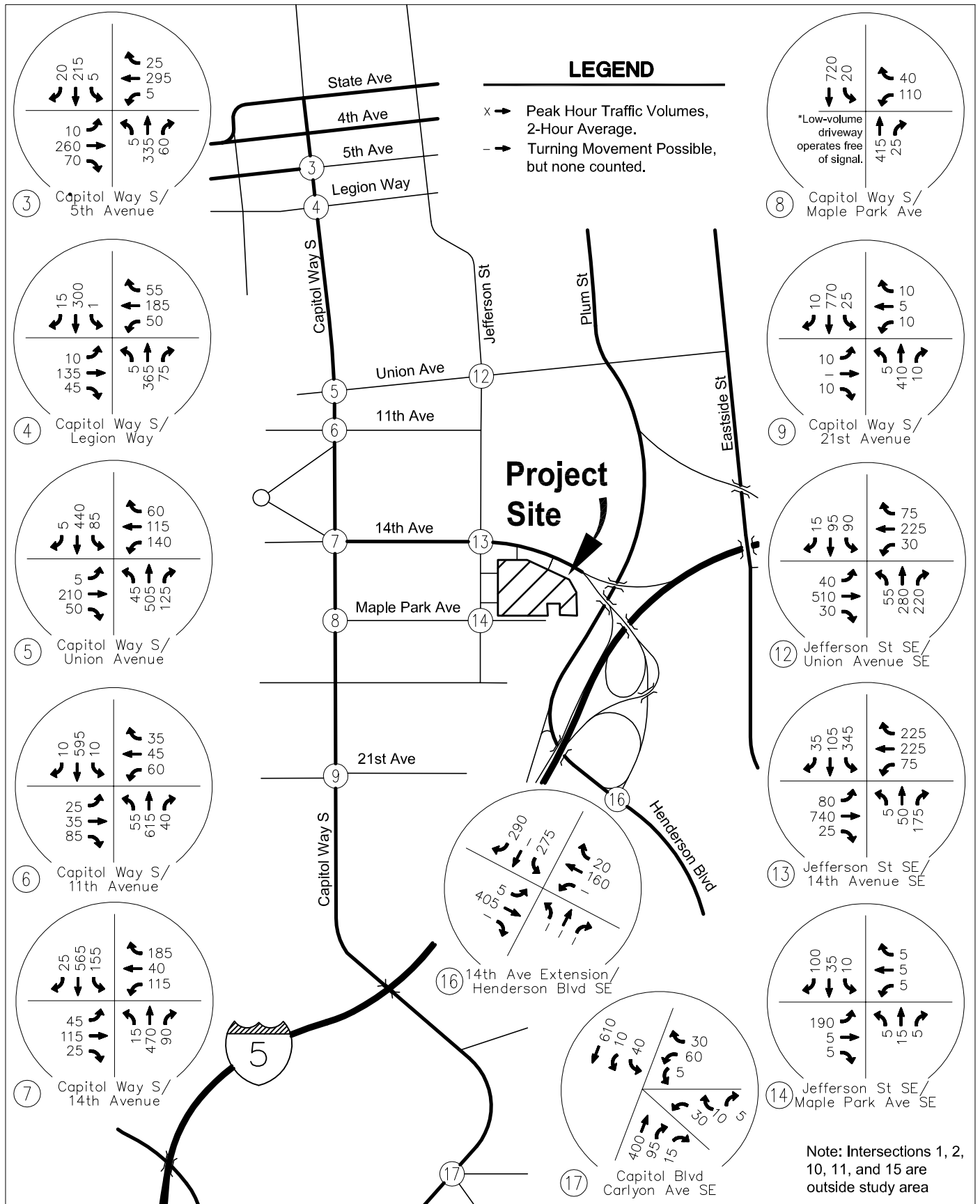
The 2010 with *DIS – Wheeler Site* project traffic volumes are shown on **Figures 6a, 6b, 6c, and 6d**. The traffic volume calculations for the study intersections are shown in *Appendix B*.



Parametrix DATE: 03/14/08 3:07pm FILE: TIA Figures\_3-13



**Figure 5a**  
**2010 Without-Project Traffic Volumes - AM Peak Hour**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**

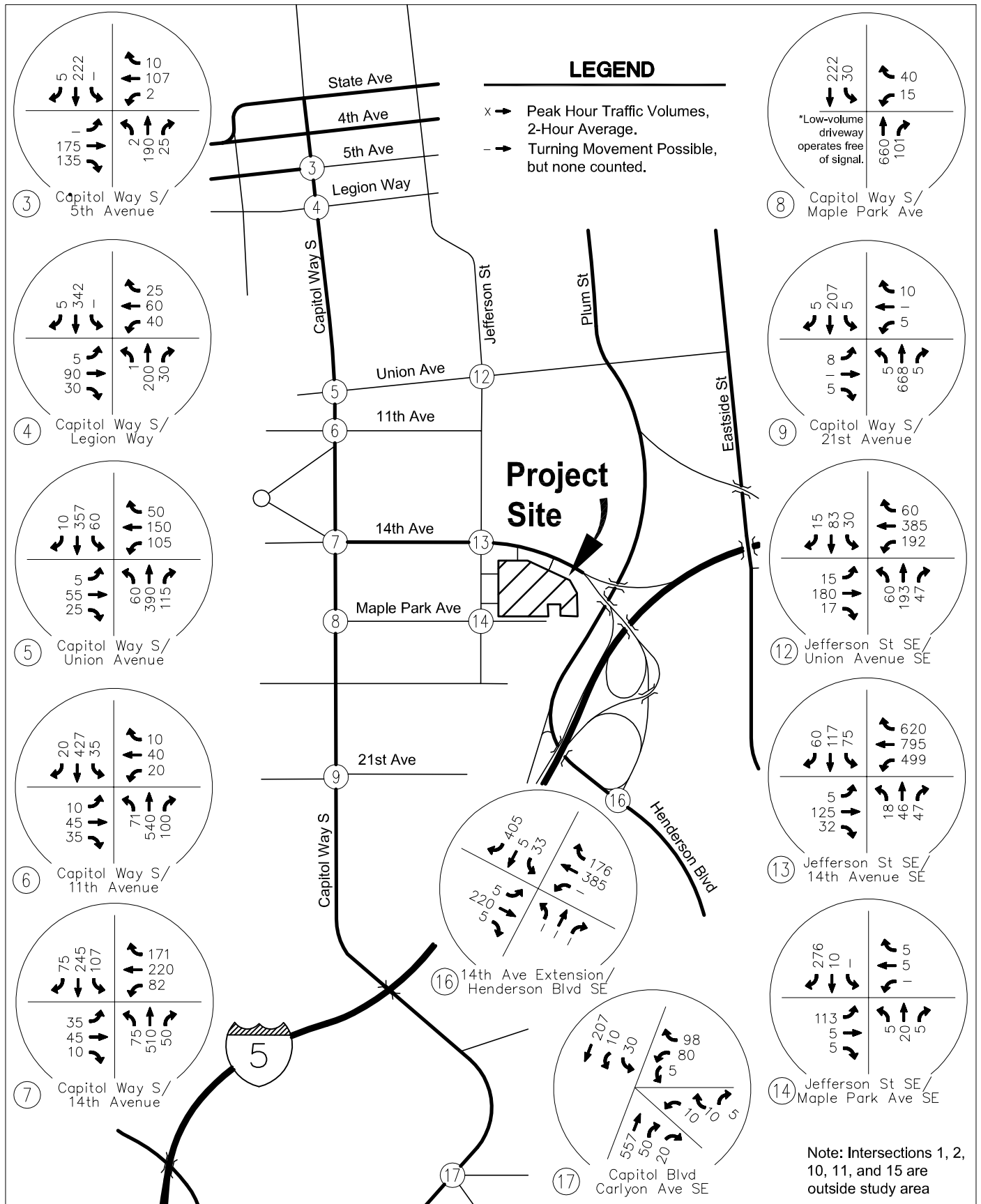


Parametrix DATE: 03/14/08 3:07pm FILE: TIA Figures\_3-13



**Figure 5b**  
**2010 Without-Project Traffic Volumes - PM Peak Hour**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**

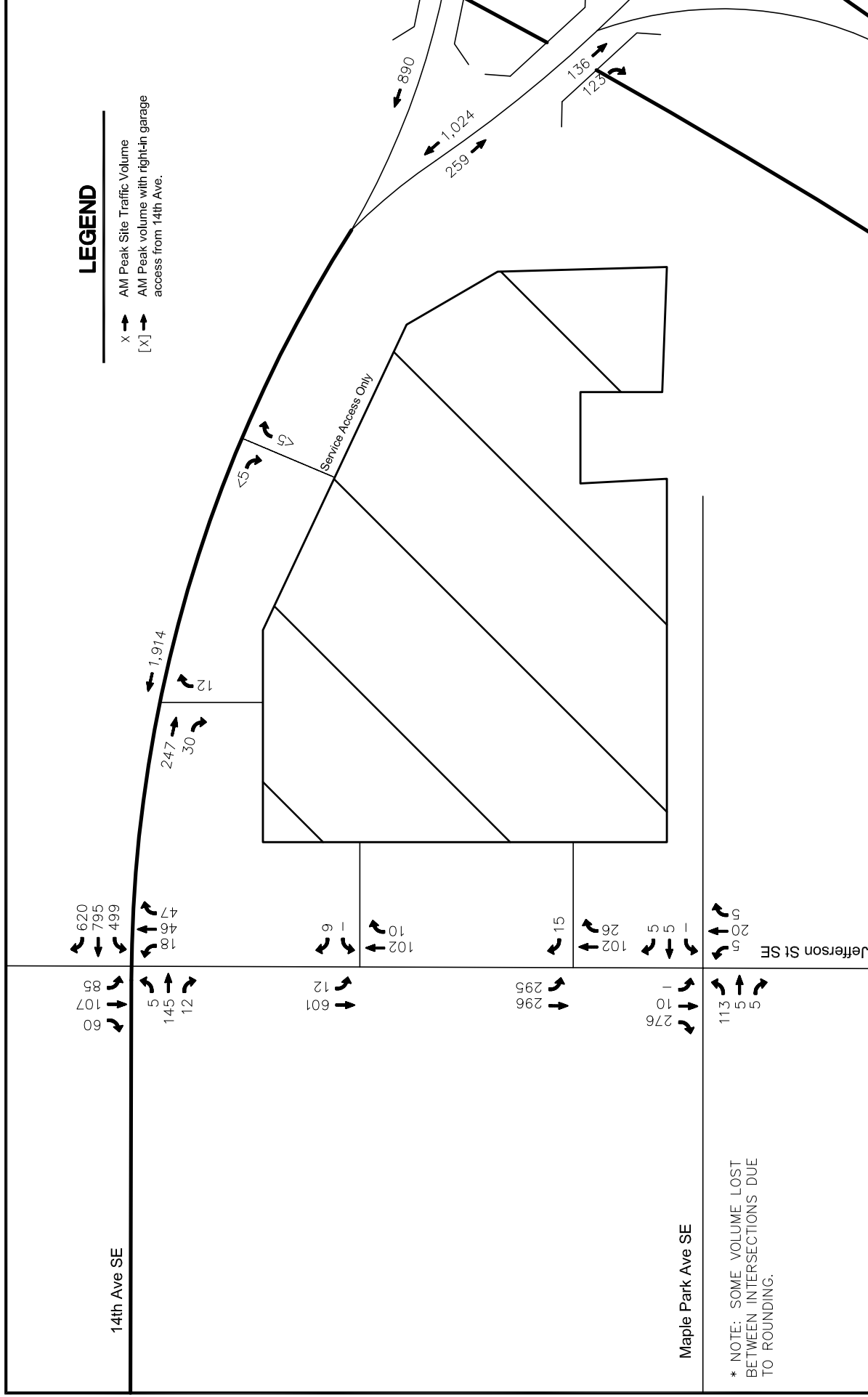




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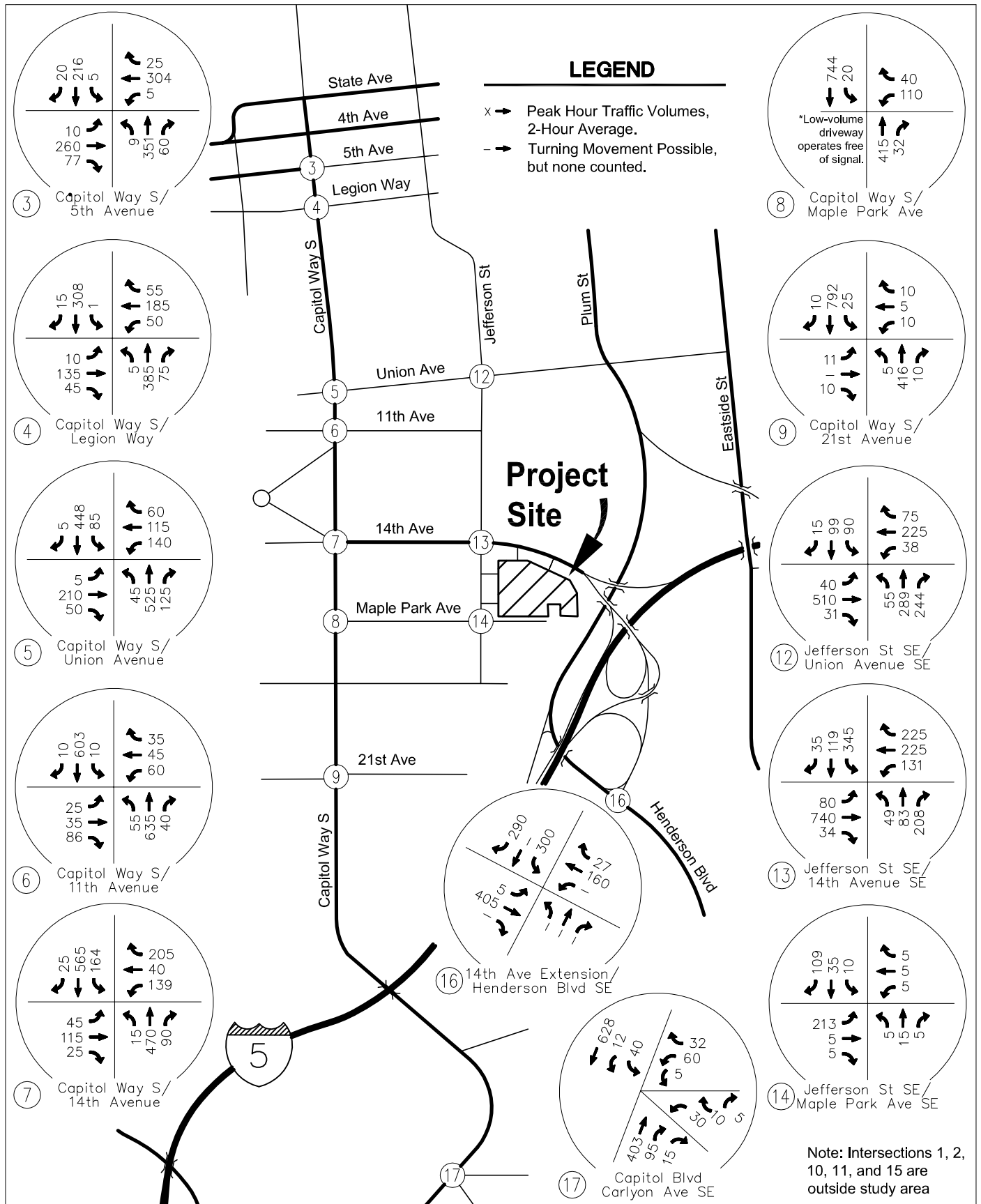
**Figure 6a**  
**2010 With-Project Traffic Volumes - AM Peak Hour**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**



**Figure 6b**  
**2010 With-Project Site Vicinity Traffic Volumes - AM Peak Hour**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**



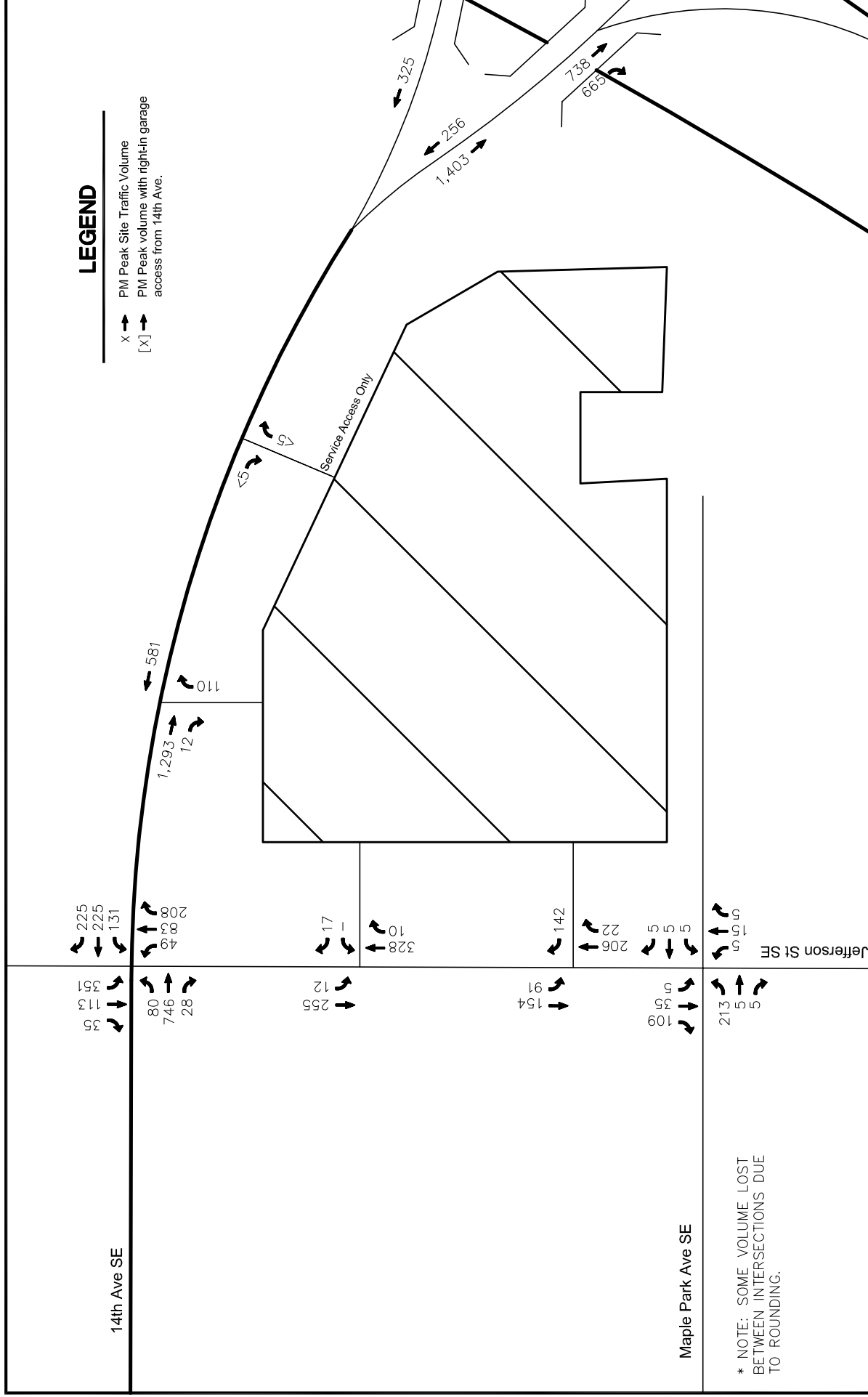
**NO SCALE**



Parametrix DATE: 03/14/08 3:07pm FILE: TIA Figures\_3-13



**Figure 6c**  
**2010 With-Project Traffic Volumes - PM Peak Hour**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**



**Figure 6d**  
**2010 With-Project Site Vicinity Traffic Volumes - PM Peak Hour**  
**WSDIS - Wheeler Site**  
**Traffic Impact Analysis**



**NO SCALE**



## 6. TRAFFIC OPERATIONS ANALYSIS

Traffic analyses were conducted to identify any capacity deficiencies within the study area for the 2008 base and 2010 project completion horizon years.

### 6.1 CAPACITY ANALYSIS

The acknowledged source for determining overall capacity for arterial segments and independent intersections is the current edition of the *Highway Capacity Manual (HCM)*. Capacity analyses were completed for the base year and projected 2010 AM and PM peak hour traffic volume scenarios.

For the signalized intersection within the study area the analysis was performed using the Synchro7 software package as required by the City of Olympia. Stop sign-controlled intersections were analyzed using the Highway Capacity Software that also utilizes the methodology in the 2000 *HCM*. Modern roundabouts were analyzed using the Sidra software package.

#### 6.1.1 Level of Service

Capacity analysis results are described in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). Level of Service E is the concurrency standard adopted by the City of Olympia for most of the study area. Exceptions include the location of the current RIRO access on 14<sup>th</sup> Avenue SE and the intersection of the 14<sup>th</sup> Avenue Extension and Henderson Boulevard, where the standard is LOS D. The City has also identified four intersections in the study area where the adopted acceptable LOS is F. Those locations include:

- Capitol Way S/Union Avenue SE
- Capitol Way S/14<sup>th</sup> Avenue SE
- Plum Street/Union Avenue SE
- Jefferson Street SE/14<sup>th</sup> Avenue SE

Level of service calculations for intersections determine the amount of ‘control delay’ (in seconds) that drivers will experience while proceeding through an intersection. Control delay includes all deceleration delay, stopped delay, and acceleration delay caused by the traffic control device. The level of service is directly related to the amount of delay experienced. For signalized intersections the overall LOS grade represents the weighted average of all movements at the intersection. Because of the weighted averaging, in some instances the overall LOS at an intersection can improve if traffic is added to a movement that receives very little delay.

For intersections under minor street stop sign-control, the LOS of the most difficult movement (typically the minor street left-turn) represents the intersection level of service. The LOS criteria for stop sign-controlled intersections are different than for signalized intersections because driver expectation is that a signalized intersection is designed to carry higher traffic volumes and experience greater delay. The following table shows the level of service criteria for signalized and stop sign-controlled intersections.

**Table 6-1. Level of Service Criteria for Intersections**

Level of Service	Average Control Delay (seconds/vehicle)	
	Signalized Intersections	Unsignalized Intersections
A	$\leq 10$	$\leq 10$
B	$> 10 - 20$	$> 10 - 15$
C	$> 20 - 35$	$> 15 - 25$
D	$> 35 - 55$	$> 25 - 35$
E	$> 55 - 80$	$> 35 - 50$
F	$> 80$	$> 50$

Source: Table 17-2, p 17-2, Highway Capacity Manual, Transportation Research Board, Washington DC, 2000.

### 6.1.2 Volume to Capacity Ratio

Another measure of the function of a signalized intersection is the ‘degree of saturation’ which is typically presented as the ‘volume to capacity’ (v/c) ratio. Many factors affect the volume of traffic an intersection can accommodate during a specific time interval. These factors include the number of lanes, lane widths, the type of signal phasing, the number of parking maneuvers on the adjacent street, etc. Based on these factors, the intersection (or individual lane group) is determined to have a total vehicle carrying capacity ‘c’ for the analysis period. The analysis period volume ‘v’ is compared to the calculated carrying capacity and presented as a ratio. If the v/c ratio is below 1.0, the demand volume is less than the maximum capacity. If the v/c ratio is over 1.0, the demand volume is exceeding the available capacity.

### 6.1.3 Vehicle Queuing

The vehicle queue is the number of stopped vehicles waiting to travel through an intersection. In this analysis, the ‘95<sup>th</sup> percentile’ maximum back of queue is described (in feet from the stop bar). The maximum back of queue includes all vehicles that stop at the intersection even after the green signal phase begins. The 95<sup>th</sup> percentile queue value reflects the ‘peak typical’ queue that occurs during the analysis period, discarding the highest five percent of queue occurrences.

The capacity analyses were completed for traffic volume conditions expected to occur during the morning and evening peak periods at all study intersections for the following three traffic volume scenarios:

- Existing 2008 traffic volumes
- Projected 2010 traffic volumes without the *DIS – Wheeler Site* development
- Projected 2010 traffic volumes with the *DIS – Wheeler Site* development

*Appendix C* provides the capacity analysis worksheets. Following is a description of the level of service analysis for the study intersections for the scenarios listed above.

## 6.2 SIGNALIZED INTERSECTIONS

### 6.2.1 Capitol Way S/5<sup>th</sup> Avenue

This intersection operates under pre-timed signal control. The north- and southbound approaches on Capitol Way S each have two travel lanes, with no left-turning movements allowed during the hours of 7 am to 7 pm. East- and westbound approaches on 5<sup>th</sup> Avenue consist of one travel lane in each direction.

The intersection operates at LOS B during peak hours. The intersection will maintain LOS B through the 2010 horizon.

The following table summarizes the operation results for this intersection:

**Table 6-2. Capitol Way S/5th Avenue Operational Summary**

Peak Hour	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	B (11.9)	0.43 (EB)	B (11.8)	0.41 (EB)	B (12.0)	0.43 (EB)
PM	B (12.6)	0.50 (EB)	B (10.8)	0.50 (EB)	B (10.8)	0.51 (EB)

### 6.2.2 Capitol Way S/Legion Way

This intersection operates under pre-timed signal control. The north- and southbound approaches on Capitol Way S each have two travel lanes, with no left-turning movements allowed during the hours of 7 am to 7 pm. East- and westbound approaches on Legion Way consist of one travel lane in each direction.

The intersection operates at LOS B during peak hours. The intersection will maintain LOS B through the 2010 horizon.

The following table summarizes the operation results for this intersection:

**Table 6-3. Capitol Way S/Legion Way Operational Summary**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	B (11.4)	0.29 (SB)	B (10.3)	0.27 (SB)	B (10.4)	0.29 (SB)
PM	B (10.8)	0.50 (WB)	B (10.8)	0.48 (WB)	B (11.0)	0.48 (WB)

### 6.2.3 Capitol Way S/Union Avenue

The Capitol Way S/Union Avenue intersection operates under actuated, coordinated traffic signal control. North- and southbound approaches on Capitol Way S each have two travel lanes and an exclusive left-turn lane. The westbound approach on Union Avenue has two travel lanes and an exclusive left-turn lane, while the eastbound approach has two travel lanes with no lanes dedicated to exclusive turning movements.



The intersection operates at LOS B during evening peak hour. The intersection will maintain LOS B through the 2010 horizon.

The following table summarizes the operation results for this intersection:

**Table 6-4. Capitol Way S/Union Avenue Operational Summary**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	B (10.1)	0.49 (WBL)	B (11.3)	0.51 (WBL)	B (11.0)	0.51 (WBL)
PM	B (12.5)	0.75 (WBL)	B (12.8)	0.76 (WBL)	B (12.7)	0.76 (WBL)

#### 6.2.4 Capitol Way S/11<sup>th</sup> Avenue

The signalized intersection of Capitol Way and 11<sup>th</sup> Avenue operates under actuated coordinated control. The north and south approaches are served by two lanes and left-turn pockets. East- and westbound approaches are served by a shared through-right lane and left-turn pockets. This intersection operates at LOS B with and without the project.

**Table 6-5. Capitol Way S/11th Avenue Operational Summary**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	B (12.5)	0.41 (EBT)	B (11.8)	0.42 (NBL)	B (11.6)	0.43 (NBL)
PM	B (12.1)	0.55 (WBL)	B (11.2)	0.59 (WBL)	B (11.2)	0.59 (WBL)

#### 6.2.5 Capitol Way S/14<sup>th</sup> Avenue

This intersection controls 14<sup>th</sup> Avenue SE, Capitol Way S and the parking garage exit parallel to the westbound approach of 14<sup>th</sup> Avenue SE. The westbound approach has a shared left-turn and through lane, as well as a single right-turn lane at which right-turn on red is not allowed. The southbound approach has a dedicated left-turn lane, right-turn lane and two through lanes. The northbound approach is served by a left-turn lane, through and shared-through and right-turn lane. A right-turn only garage entrance is also on the northbound approach.

**Table 6-6. Capitol Way S/14th Avenue Operation Summary**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	C (30.7)	0.59 (WBT)	C (27.4)	0.75 (WBT)	C (28.2)	0.75 (WBT)
PM	C (28.1)	0.57 (WBT)	C (25.8)	0.58 (WBT)	C (27.2)	0.64 (SBL)

### 6.2.6 Capitol Way S/Maple Park Avenue SE

This t-intersection operates under actuated-coordinated control. An existing driveway on the west leg of the intersection is not controlled by the signal. The southbound approach has two through lanes and a left-turn lane; the northbound approach has a single through lane and a left-turn lane; and the westbound approach has a left-turn and right-turn lane.

**Table 6-7. Capitol Way S/Maple Park Avenue SE Operational Summary**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	A (3.7)	0.30 (NB)	A (3.2)	0.32 (NB)	A (2.9)	0.32 (NB)
PM	B (10.3)	0.55 (WBL)	A (7.3)	0.56 (WBL)	A (6.1)	0.54 (WBL)

### 6.2.7 Capitol Way S/21<sup>st</sup> Avenue

This offset intersection operates under actuated-coordinated control. Both the northbound and southbound approaches have two through lanes; turns are made from the through lanes. East and west legs have a single approach lane.

**Table 6-8. Capitol Way S/21st Avenue Operational Summary**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	A (3.8)	0.33 (NB)	A (3.9)	0.34 (NB)	A (4.2)	0.35 (NB)
PM	A (4.5)	0.38 (SB)	A (4.2)	0.39 (SB)	A (4.8)	0.41 (SB)

### 6.2.8 Capitol Way S/Carlyon Avenue SE

This intersection, which also includes Sunset Way, operates under actuated-coordinated control. Both the westbound (Carlyon) and northwest-bound (Sunset) approaches have a single lane. Southwest-bound Capitol Way has two through lanes and a left-turn lane. Northeast-bound Capitol Way has two lanes.

**Table 6-9. Capitol Way S/Carlyon Avenue SE Operational Summary**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	B (11.5)	0.56 (WB)	B (15.6)	0.74 (WB)	B (15.7)	0.74 (WB)
PM	A (9.9)	0.51 (NWB)	B (10.6)	0.52 (WB)	B (10.6)	0.52 (WB)

### 6.2.9 Jefferson Street SE/Union Avenue SE

This actuated-uncoordinated intersection is projected to operate at LOS A in 2010. Both westbound and eastbound approaches have two through lanes and a left-turn lane. The northbound approach has two lanes; the southbound approach has a single through lane and a left-turn lane.

**Table 6-10. Jefferson Street SE/Union Avenue SE Operational Summary**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	A (6.5)	0.42 (WBL)	A (6.7)	0.44 (WBL)	A (7.0)	0.50 (WBL)
PM	A (8.9)	0.53 (EBT)	A (8.3)	0.55 (NBT)	A (8.4)	0.55 (NBT)

### 6.2.10 Jefferson Street SE/14<sup>th</sup> Avenue SE

This actuated-uncoordinated signal currently operates at LOS C or better during the peak hours, as shown in **Table 6-11**. With the addition of traffic from the proposed project, operations will degrade to LOS D during the PM peak hour in 2010. LOS D meets the City's LOS E standard for this intersection, but a detailed evaluation indicates that the left-turn queue on the westbound approach exceeds the existing 150 feet of storage during the AM peak hour. Projected queues of approximately 480 feet would extend into the controlled access area and would not provide sufficient area for traffic from 14<sup>th</sup> Avenue SE and the I-5 southbound off-ramp to safely merge and select the appropriate lane at the intersection approach.

**Table 6-11. Jefferson Street SE/14th Avenue SE Operational Summary**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	B (10.1)	0.69 (WBL)	B (10.5)	0.64 (WBL)	B (15.5)	0.82 (WBL)
PM	C (29.1)	0.81 (EB)	C (31.5)	0.83 (EB)	D (46.1)	0.96 (NBT)

To alleviate concerns associated with westbound storage availability during the AM peak hour, and improve operations of the signal, this intersection will be reconstructed with development of the *DIS - Wheeler Site*. If these intersection improvements use the signalized concept shown in **Figure 2a**, the signal is expected to operate at LOS B during the AM peak hour and at LOS C during the PM peak hour, as shown below in **Table 6-12**.

**Table 6-12. Jefferson Street SE/14th Avenue SE Operational Summary – Signal Improvements**

Approach	2010 With Project - No Improvement		2010 With Project - Improved		2030 With Project - Improved	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	B (15.5)	0.82 (WBL)	B (14.9)	0.72 (WBL)	B (16.8)	0.74 (WBL)
PM	D (46.1)	0.96 (NBT)	C (25.6)	0.82 (EBT)	C (29.2)	0.86 (EBT)

## 6.3 ROUNDABOUTS

### 6.3.1 14<sup>th</sup> Avenue Extension/Henderson Boulevard SE

This intersection is controlled by a single-lane modern roundabout with single-lane entries and exits. The southwest-bound right-turn movement is served by a continuous right-turn lane to serve traffic from the interstate bound for downtown Olympia. As **Table 6-13** indicates, this intersection currently operates at LOS A and will continue to operate at LOS A with- or without the proposed project.

**Table 6-13. 14<sup>th</sup> Avenue Extension/Henderson Boulevard SE**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	A (6.0)	0.35 (NWB)	A (6.0)	0.38 (NWB)	A (6.1)	0.40 (NWB)
PM	A (8.5)	0.50 (SEB)	A (8.7)	0.52 (SEB)	A (9.0)	0.54 (SEB)

### 6.3.2 Jefferson Street SE/14<sup>th</sup> Avenue SE

Operations of the existing signal are presented in the previous section. If this intersection is reconstructed as a roundabout with the project, it can be expected to operate at LOS A in the AM peak hour and LOS B in the PM peak hour, as shown below in **Table 6-14**. Detailed operational results are provided in *Appendix C*. Queues on the eastbound approach to this signal would be regulated by the existing signal to the west at the garage exit.

**Table 6-14. Jefferson Street SE/14<sup>th</sup> Avenue SE – Roundabout Improvements**

Approach	2010 With Project – No Improvement		2010 With Project - Improved		2030 With Project - Improved	
	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c	LOS (Delay)	Worst v/c
AM	N/A	N/A	A (9.1)	0.59 (WB)	A (9.7)	0.67 (WB)
PM	N/A	N/A	B (13.4)	0.77 (EB)	B (17.3)	0.92 (NB)

## 6.4 UNSIGNALIZED INTERSECTIONS

### 6.4.1 Jefferson Street SE/Maple Park Avenue SE

The intersection of Maple Park Avenue and Jefferson Street currently operates at LOS B during both the AM and PM peak hours. With addition of traffic from the proposed development, this stop-controlled intersection is expected to continue operating at LOS B during peak hours

**Table 6-15. Jefferson Street SE/Maple Park Avenue SE Operational Summary**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst Movement	LOS (Delay)	Worst Movement	LOS (Delay)	Worst Movement
AM	B (10.7)	EB	B (11.0)	EB	B (11.2)	EB
PM	B (12.4)	EB	B (12.7)	EB	B (13.2)	EB

### 6.4.2 14<sup>th</sup> Avenue SE/Right-In Right-Out Access

This new access is located between the existing right-in right-out access on 14<sup>th</sup> Avenue SE and the intersection of 14<sup>th</sup> Avenue and Jefferson Street. Improvements associated with this access include extension of the existing merge lane on 14<sup>th</sup> Avenue from the Jefferson Street intersection to the existing service access to the east, as shown in **Figures 2a** and **2b**. This improvement removes acceleration and deceleration maneuvers from the travel lanes on 14<sup>th</sup> Avenue and improves the projected safety and operations of 14<sup>th</sup> Avenue near the proposed access point.

This access would provide right-in and right-out access to the parking garage. The worst delay expected in the horizon year is during the PM peak; the northbound approach is expected to operate at LOS D.

**Table 6-16. 14<sup>th</sup> Avenue SE/Right-In Right-Out Access**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst Movement	LOS (Delay)	Worst Movement	LOS (Delay)	Worst Movement
AM	NA	NA	NA	NA	A (9.2)	NBR
PM	NA	NA	NA	NA	D (27.6)	NBR

### 6.4.3 14<sup>th</sup> Avenue SE Service/Emergency Vehicle Only Access

Data Collection shows current outbound peak hour volumes at this location to be 12 vehicles during the AM peak hour, and 34 vehicles during the PM peak hour. The *DIS – Wheeler Site* will reconfigure the driveways so that this access will be used for service and emergency vehicle access only. Because fewer than 5 trips are expected to use this access during peak hours, this access location was not analyzed.

#### 6.4.4 Jefferson Street SE/North Access

The north site access is one of two new proposed access points to Jefferson Street SE from the project that will replace the two existing access points provided on Wheeler Avenue SE and 15<sup>th</sup> Avenue SE. The north access will be approximately midway between 14<sup>th</sup> Avenue SE and Maple Park Avenue, and will provide full access to a surface lot containing approximately 20 parking stalls. This access point is expected to operate at LOS B during the PM peak hour, and LOS A during the AM peak hour.

**Table 6-17. Jefferson Street SE/North Access**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst Movement	LOS (Delay)	Worst Movement	LOS (Delay)	Worst Movement
AM	NA	NA	NA	NA	A (8.7)	WB
PM	NA	NA	NA	NA	B (10.4)	WB

#### 6.4.5 Jefferson Street SE/South Access

The south site access is one of two proposed new access points to Jefferson Street SE from the project that will replace the two existing access points provided by Wheeler Avenue SE and 15<sup>th</sup> Avenue SE. The south access will be partially offset to the north of Maple Park Avenue SE, and will provide access for vehicles entering and exiting the proposed on-site parking garage. Exiting movements will be limited to right-turn only. The access is expected to operate at LOS A during the AM peak hour and LOS C or better during the PM peak hour.

**Table 6-18. Jefferson Street SE/South Access**

Approach	Base Year 2008		2010 Without Project		2010 With Project	
	LOS (Delay)	Worst Movement	LOS (Delay)	Worst Movement	LOS (Delay)	Worst Movement
AM	NA	NA	NA	NA	A (9.2)	WB
PM	NA	NA	NA	NA	C (15.9)	WB

The HCS analysis reported above does not assume a free right-turn movement as is proposed for this access point. The analysis assumes a stop controlled movement with one through lane on the major street and is therefore more conservative than the projected conditions.

## 6.5 INTERSECTION OPERATIONS SUMMARY

**Table 6-20**, below, summarizes existing and future operations for all intersections analyzed in connection with the *DIS – Wheeler Site* development.

**Table 6-19. DIS-Wheeler Site Intersection Analysis Summary**

Intersection	Existing 2008 LOS		Projected 2010 LOS – Without Project		Projected 2010 LOS – With Project	
	AM	PM	AM	PM	AM	PM
<i>Signalized/Roundabout</i>						
Capitol Way S/5 <sup>th</sup> Ave.	B	B	B	B	B	B
Capitol Way S/Legion Way	B	B	B	B	B	B
Capitol Way S/Union Ave.	B	B	B	B	B	B
Capitol Way S/11 <sup>th</sup> Ave.	B	B	B	B	B	B
Capitol Way S/14 <sup>th</sup> Ave.	C	C	C	C	C	C
Capitol Way S/Maple Park Ave. SE	A	B	A	A	A	A
Capitol Way S/21 <sup>st</sup> Ave.	A	A	A	A	A	A
Capitol Way S/Carlyon Ave. SE	B	A	B	B	B	B
Jefferson Street SE/Union Ave. SE	A	A	A	A	A	A
Jefferson Street SE/14 <sup>th</sup> Ave. SE	B	C	B	C	B	D
Jefferson Street SE/14 <sup>th</sup> Ave. SE (signal improvements)	N/A	N/A	N/A	N/A	B	C
Jefferson Street SE/14 <sup>th</sup> Ave. SE (roundabout)	N/A	N/A	N/A	N/A	A	B
14 <sup>th</sup> Ave. Extension/Henderson Blvd SE	A	A	A	A	A	A
<i>Unsignalized</i>						
Jefferson Street SE/Maple Park Ave SE	B	B	B	B	B	B
14 <sup>th</sup> Ave/Right-In Right-Out Access	N/A	N/A	N/A	N/A	A	D
Jefferson Street SE/North Access	N/A	N/A	N/A	N/A	A	B
Jefferson Street SE/ South Access	N/A	N/A	N/A	N/A	A	C

## 7. MITIGATION

No level of service deficiencies were identified at the study intersections during the analysis process. However, several potential concerns in the immediate vicinity of the proposed *DIS – Wheeler Site* were identified. The site frontage and off-site improvements described below are proposed as measures to mitigate identified concerns.

### 7.1 INTERSECTION IMPROVEMENTS AT 14<sup>TH</sup> AVENUE SE/JEFFERSON STREET SE

The intersection of 14th Avenue SE and Jefferson Street SE is projected to operate at an acceptable level of service during the horizon year. However, the westbound left-turn queues are expected to exceed the available storage in some instances. Lengthening the single left-turn lane, however, would create queues extending into the I-5 access area controlled by WSDOT, and would not provide adequate separation between the I-5 southbound off-ramp and the intersection. For this reason, improvements to the signalized intersection must include incorporation of a second westbound left-turn lane. Addition of this second left-turn lane would alleviate problems with the queue length, and would allow more efficient signal phasing because a shorter cycle could accommodate the same turning volumes. However, the pedestrian crossing distance on 14th Avenue SE would be lengthened, which decreases the efficiency of the signal and increases exposure of pedestrians. Although the pedestrian refuge islands will be improved as a part of this project, the City may choose to eliminate pedestrian crossings on the east leg of this intersection and only allow pedestrians to cross via the new crossing provided on the west leg.

An alternative to signal improvements could be construction of a multi-lane roundabout. A roundabout would provide shorter pedestrian crossing distances, and would provide fewer delays than a signal.

Either solution will require addition of a second southbound lane on Jefferson Street SE, south of 14th Street SE. Both configurations assume continued operation of the upstream signal to the west of the intersection, which regulates the merging of eastbound traffic from the garage and the tunnel.

### 7.2 NON-MOTORIZED CONNECTIONS

The proposed *DIS – Wheeler Site* project should provide connections to existing sidewalks and bike lanes to facilitate safe and efficient operations of these travel modes. The proposed improvements and new facilities are illustrated as components of the conceptual site plan in **Figures 2a** and **2b**. Design and implementation of these improvements should be coordinated with the City of Olympia during the development process.

### 7.3 NEIGHBORHOOD TRAFFIC CALMING

Residents of the neighborhoods surrounding the proposed project site have expressed concern about existing traffic patterns and driver behavior; particularly speeding and cut-through traffic. Current traffic patterns and projections from the transportation planning model do not indicate that routes through the neighborhood will provide an attractive alternative route for project traffic. However, to help alleviate potential concerns related to cut-through traffic from the project, the developer has agreed to work with the City of Olympia to identify locations and implement traffic calming devices that could enhance preservation of the neighborhood character on local roadways in the immediate vicinity of the project. Bulb-out or median devices at the key intersections of Maple Park Avenue with Jefferson Street SE



and Franklin Street SE could promote pedestrian safety and reduce vehicle speeds. The intersection of Jefferson Street with 17<sup>th</sup> Avenue SE may also be a candidate for traffic calming devices such as a traffic circle or bulb-outs. These solutions could be accompanied by signage to identify the locations as gateways to surrounding neighborhoods.

#### **7.4 CITY OF OLYMPIA TRAFFIC MITIGATION FEE**

The City of Olympia collects traffic mitigation fees from new developments to help fund needed roadway and intersection improvements throughout the City. The project developer is currently in discussions with the City of Olympia to determine the appropriate contribution to future improvements.

## 8. CONCLUSIONS

The Washington State Department of Information Services (DIS) proposes development of the *DIS – Wheeler Site* project on the southeast portion of the Capitol Campus in the City of Olympia. The overall project will include a mix of office and data center space to be occupied by DIS, the Washington State Patrol (WSP) and other State agencies, along with on-site parking facilities to accommodate employees and visitors.

This study has analyzed several intersections in the project vicinity for the 2010 horizon, including the *DIS – Wheeler Site* development. Based on this analysis, all of the study roadways and intersections can accommodate the projected traffic levels with completion of the mitigation items identified in the previous section of this report.

